



LADOT Dockless Shared Mobility Program

MDS API Technical Compliance Overview

v1.1

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1) Summary of Approach

This document defines MDS compliance through a set of tests and associated frequencies that facilitate initial and ongoing compliance assessments and operational audits of Mobility Service Providers (“MSP”) operating on the public right-of-way in the City of Los Angeles.

Overall compliance with LADOT’s Dockless Shared Mobility program is made up of two separate compliance measurements: technical compliance and operational compliance. **Technical compliance** refers to whether MSPs are properly providing the Open Mobility Foundation (OMF) MDS Provider endpoint, as well as interacting with the Los Angeles installation of the OMF MDS City Services API endpoints within rental and fleet management workflows. **Operational compliance** refers to how MSPs are performing against the LADOT set of equity, caps, and usage metrics.

Technical compliance consists of compliance to the OMF MDS Provider API, OMF MDS City Services API endpoints, and 311 Integration. This document specifically addresses Technical compliance with the Los Angeles installation of the OMF MDS City Services API endpoints along with the MSP-provided OMF MDS Provider endpoint.

How to use this document

This document identifies the compliance program that LADOT will use as part of managing the dockless mobility one year permit and any subsequent permit extension. This document should be treated as the authoritative source for compliance to: i) the Los Angeles installation of the OMF MDS City Services API endpoints; and ii) the Los Angeles requirements for MSP-provided OMF MDS Provider endpoint, and supersedes any previous documents.

This document does not outline how the City of Los Angeles shall enforce or remediate non-compliance issues with MSPs against permitting requirements.

References & Resources

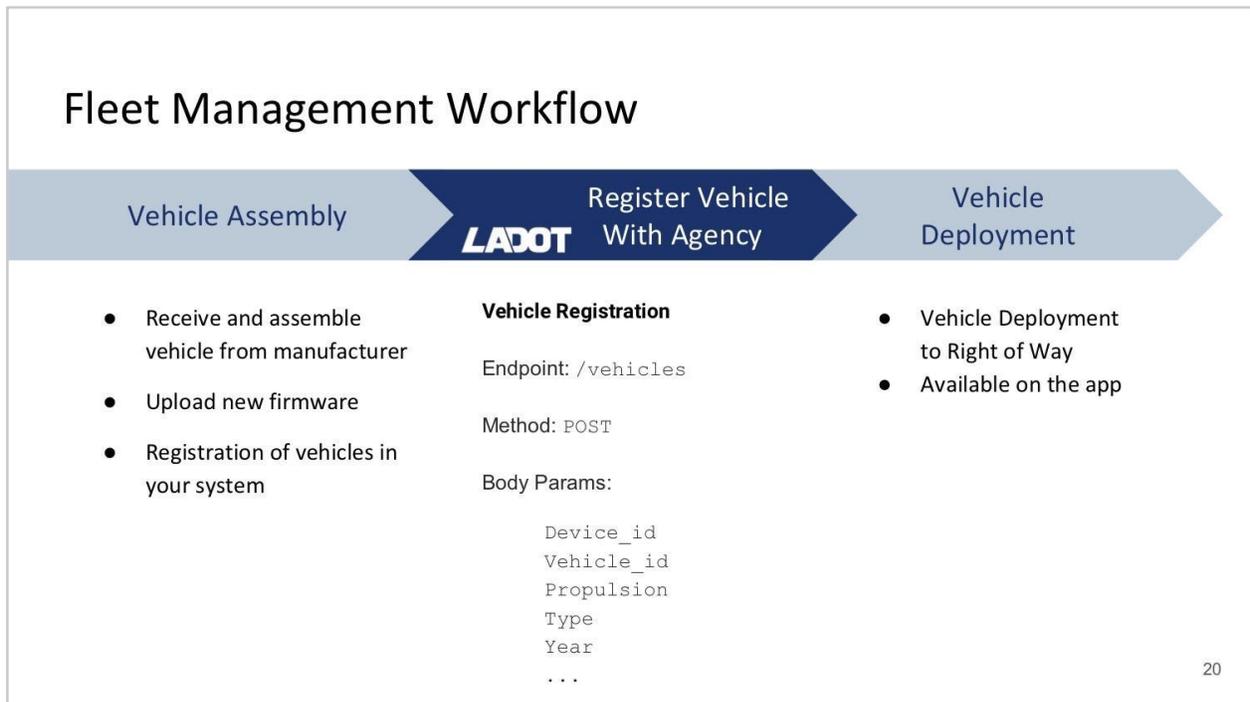
1. **MDS Github** - <https://github.com/CityOfLosAngeles/mobility-data-specification/>
2. **LADOT.io website** - <https://ladot.io/programs/dockless/>
3. **MDS Developer Webinar for One Year Permitting** - https://ladot.lacity.org/sites/g/files/wph266/f/MDS%20Developer%20Webinar%20-%20One%20Year%20Permitting%20Overview_03-06-19_REVISION.pdf
4. **Governing via API Open Source Collaboration in City Government** - <https://docs.google.com/presentation/d/1LekpQHM9JD5Is0JVqkL6jFn52r15e8hd7J2cquEJYVI/edit?usp=sharing>

2) LADOT OMF MDS City Services API Workflows & Methodology

Workflows and methodology are described in slides 20-26 of the LADOT **MDS Developer Webinar for One Year Permitting**, which are included below for easy reference. The full presentation can be found at the following weblink:

https://ladot.lacity.org/sites/g/files/wph266/f/MDS%20Developer%20Webinar%20-%20One%20Year%20Permitting%20Overview_03-06-19_REVISION.pdf

MDS Developer Webinar for One Year Permitting - Presentation Reference Slides



Deployment Workflow

Vehicle Deployment	LADOT Deploy Vehicle With Agency	Rental Operations
<ul style="list-style-type: none">• Vehicle Deployment to Right of Way	<p>Vehicle Event</p> <p>Endpoint: <code>/vehicles/{device_id}/event</code></p> <p>Method: <code>POST</code></p> <p>Body Params:</p> <pre>Event_type = 'service_start' rebalance_drop_off maintenance_drop_off</pre>	<ul style="list-style-type: none">• Start Service

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Start Trip Workflow

Request Rental	LADOT Start Trip with Agency	Start Ride
<ul style="list-style-type: none">• User requests rental start• User scans barcode• Start of reservation	<p>Vehicle Event</p> <p>Endpoint: <code>/vehicles/{device_id}/event</code></p> <p>Method: <code>POST</code></p> <p>Body Params:</p> <pre>Event_type = 'trip_start'</pre>	<ul style="list-style-type: none">• Unlock Vehicle• Secure Payment• Notify App

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Update Telemetry Workflow

End Ride OR $t \geq 30m$ OR $t \leq 24$ hrs



Update Agency

End Ride OR $t < 24$ hrs after End Ride

- During ride or after termination of ride

Telemetry

Endpoint:
`/vehicles/telemetry`

Method: `POST`

Body Params:

```
device_id
timestamp
GPS
charge
```

- Prior to ride completion OR expiration of 24 hour period after ride.

End Trip Workflow

Start Ride || Update Telemetry



End Trip
With Agency

End Ride

- User requests rental start
- User scans barcode
- Start of reservation
- Update Telemetry

Vehicle Event

Endpoint:
`/vehicles/{device_id}/event`

Method: `POST`

Body Params:

`Event_type = 'trip_end'`

- Unlock Vehicle
- Secure Payment
- Notify App

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Retrieval Workflow

Rental Operations



Retrieve Vehicle
With Agency

Removal

- Vehicle Deployment to Right of Way

Vehicle Event

Endpoint:
`/vehicles/{device_id}/event`

Method: `POST`

Body Params:

`Event_type = 'service_end'`

- Retrieval from street

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3) LADOT OMF MDS City Services API Compliance Overview

Initial and Ongoing Compliance Goals

1. Verify that MSPs have correctly implemented support for the OMF MDS City Services API endpoints and continue that support through the permit program.
2. Make sure that Mobility Service Providers are accurately reporting data per the OMF MDS City Services API endpoints specification openmobilityfoundation.com/mobility-data-specification/agency and within the expected timing and behaviors outlined in this document.

Mobility Service Provider's Expectations

1. Integrate with LADOT's OMF MDS Agency APIs and notify LADOT of support prior to award of one-year permit and reaffirm support as part of any permit extension.
2. Use LADOT's OMF MDS Agency APIs for all vehicles in use on streets in the City of Los Angeles.
3. Submit all events accurately as described in the OMF MDS Agency specification.
4. Submit all events within the expected timing and behaviors outlined in this document.
5. Continue compliance with the OMF MDS Agency APIs over the duration of the one-year permit, including i) new versions of the mobile application you may release; ii) new versions of the OMF MDS Agency that LADOT may adopt; and iii) new timing and behaviors that LADOT may release.

4) MDS Agency API Technical Compliance

LADOT OMF MDS Agency API Initial Technical Compliance Stages

Initial verification of Technical compliance comprises three (3) stages that each MSP must pass through to earn the designation of technically compliant.

Stage 1- Not Compliant [State 0]

This is the default state of an MSP in the City of Los Angeles. This state is typically used when an MSP has not been tested or is in violation as a result of an operational or technical test.

Stage 2- In-Test [State 1]

This state is used to describe an MSP that is currently being tested by LADOT. Some testing requires a 24-36 hour period to complete.

Stage 3- Compliant [State 2]

This state is used to describe an MSP who has successfully passed all LADOT compliance testing.

Once an MSP has passed through the three stages outlined above, they are required to be in on-going Technical compliance with the LADOT OMF MDS City Services implementation. Ongoing Technical compliance with the LADOT OMF MDS Agency consists of the following:



LADOT OMF MDS Agency API On-going Technical Compliance Requirements

1. All dockless vehicles present in the LA public right-of-way (defined by /service_areas) must be registered with MDS registry endpoint (/vehicles) prior to deployment.
2. All vehicle events that involve public right-of-way must include accurate telemetry and timestamp, as described by the MDS event (/vehicles/{device_id}/event) endpoint.
3. Vehicles must have an associated *provider_drop_off* or *service_start* event posted (/vehicles/{device_id}/event) at the time the vehicle is placed in the public right-of-way.
4. All vehicles in the public right-of-way (/service_areas) and appearing in the MSP's app as available for rent must have a status of *available* in MDS and vice-versa.
5. Vehicles with a status of *available*, *unavailable*, *trip*, or *reserved* are considered in the public right-of-way and will count against vehicle caps.
6. Vehicles must have an associated *provider_pick_up* or *service_end* event posted (/vehicles/{device_id}/event) at the time the vehicle is removed from the public right-of-way.
7. Vehicles must have an associated *trip_enter* or *trip_leave* event posted (/vehicles/{device_id}/event) at the time a vehicle that is actively in use enters or leaves the LA city boundary (/service_areas).
8. Vehicles must have an associated (with trip_id) *trip_start* event posted (/vehicles/{device_id}/event) within 5 seconds of a user unlocking the vehicle for use.
9. Vehicles must have an associated (with trip_id) *trip_end* event posted (/vehicles/{device_id}/event) within 5 seconds of a user locking the vehicle via the MSP's mobile app.
10. Trip telemetry data must be provided via the telemetry endpoint (/vehicles/telemetry) during the trip or within 24 hours of trip completion. The telemetry data must include a telemetry measure point at least every 30 meters along the path traveled within the LA city boundary (/service_areas).
11. A *deregister* event should only be posted (/vehicles/{device_id}/event) when a vehicle is missing, with a high probability of not being recovered, or being taken out of service indefinitely.

5) MDS Agency API Technical Compliance - Testing Methodology

Technical compliance requires testing of the vehicle during normal operations including rental and maintenance workflows performed by the MSPs. Compliance is done in two parts. Part one is a Query testing using tooling that can be run from a desktop or that is automatically generated from a reporting engine built into the OMF MDS-core code. Part two is a set of in-field testing to assess compliance during rental operations. Either of these tests can be run using different types of tooling. The procedures for Query Testing and In-Field Testing are as follows:



Part One - Query Testing

1. For each MSP, ensure that > 250 vehicles are registered in the vehicle registry
2. For each MSP, ensure that > 250 vehicles are deployed in a relevant service area
3. For each MSP, ensure that >100 trips with Start Trip, End Trip and Telemetry have been recorded with Agency endpoints
4. For each MSP, ensure that there are >0 enter and leave events registered with Agency endpoints
5. For each MSP, ensure that there are >0 drop off events registered with Agency endpoints
6. For each MSP, ensure that /telemetry reporting was provided within 24 hours of end_trip event
7. For each MSP, ensure that /telemetry reporting was provided within 300 ft or 30 seconds of start_trip event

Part Two - In-Field Testing of a Mobility Service Provider

The in-field test is broken into two parts, a pre-rental test and post-rental test separated by a vehicle rental. These tests assess whether MSPs are accessing the LADOT OMF MDS Agency vehicle endpoints when prescribed. This test also has a delayed assessment for reporting trip telemetry data after 24 hours have elapsed.

Pre-Rental Procedure

1. Find a vehicle in the street to test according to a geography specific test plan outlined by the city.
2. Check to make sure that the vehicle is in the proper state by comparing the state of the vehicle on the ground against the state of the vehicle reported on the MDS compliance app and the Provider's app. Record any discrepancies on vehicle test report.
3. Scan QR code or enter the device_ID physically present on the vehicle into the MDS compliance app.

Vehicle Rental

1. Initiate process on MSP app to start a vehicle rental.
2. Ride vehicle for a period greater than 6 minutes and a distance greater than 1200 ft.
3. End rental using MSP application.

Post-Rental Procedure

1. Verify that the MSP properly notified LADOT of the scooter unlock using MDS compliance app.
2. Verify that the MSP properly notified LADOT of the scooter being locked using MDS compliance app.

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1. Verify that the MSP notifies LADOT of the telemetry updates were reported on the compliance rides via the MDS compliance app. Record any exceptions.

6) LADOT OMF MDS Provider API Technical Compliance

MSPs must submit a pull request on GitHub (if they have not already received API compliance approval from LADOT), and submit the following OMF MDS Provider 0.4.1 API endpoint URLs (or any subsequent version as so directed by LADOT), either in a written attached document, or via email to ladot.innovation@lacity.org:

- MDS-Provider: trips
- MDS-Provider: status_changes
- MDS-Provider: Realtime Data, system_information
- MDS-Provider: Realtime Data, free_bike_status

Any MDS compatible API must expose data where:

- The trip starts in the City of Los Angeles, or
- The trip ends in the City of Los Angeles, or
- GPS telemetry data shows the trip passing through the City of Los Angeles, or
- A crow-flies path between trip start and trip end intersects the City of Los Angeles, or Shapefile of city boundaries on GeoHub located at:
https://services5.arcgis.com/7nsPwEMP38bSkCjy/arcgis/rest/services/City_Boundary_geoJSON/FeatureServer

If MSP was previously approved for a conditional permit, the API endpoints should be production endpoints that reflect current operations. However, if MSP was not approved for the Conditional Permit, MSP may submit MDS compliant “Staging” URL endpoints with demonstration data. If MSP submits staging URL endpoints for the application, MSP must have production URLs verified by LADOT staff within one month of launch of operations.

A complete application must include a Mobility Data Specification (MDS) compliance confirmation from ladot.innovation@lacity.org. For questions about compliance with the data sharing requirements, please contact: ladot.innovation@lacity.org Attn: MDS in the subject line.